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AUTHOR Fleming, S. P.; And Others
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ABSTRACT

Metacognitions about study activities and strategy use were assessed in 166 fifth and sixth graders (54 percent female and 39 percent African American), 108 seventh and eighth graders (55 percent female and 32 percent African American), and 168 college students (60 percent female, 10 percent African American, and 10 percent from other ethnic groups). Via a self-report questionnaire requiring responses on a 5-point scale, participants reported their uses of study strategies, including rote strategies, cognitive strategies, self-regulatory activities while studying, and persistence in academic tasks. Factor analyses yielded no common factor solution to characterize fifth and sixth graders, seventh and eighth graders, and college students. Three-factor solutions for the age groups' reports of study activities indicated a developmental trend for increasing differentiation of lower-level (rote) strategies and higher-level (meaning-based) strategies emerging with such differentiation in the junior high school years. Two tables present study findings. An appendix contains the questionnaire items used to measure metacognitions. (SLD)

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Developmental changes in the factor structure of a self-report measure of study activities

Fleming, S. P., Cornwell, J. M., Tonglet, J. P., Cassell, K. R.,
Obach, M. S., Respess, D. M., Deichmann, M. M.,
Poche, M. G., & Moely, B. E.
Department of Psychology
Tulane University
New Orleans, LA 70118

Paper presented at the annual meeting of the American Educational Research Association, April 12-16, 1993, in Atlanta, GA.

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Abstract

Metacognitions about study activities and strategy use were assessed in children from fifth through the eighth grades and college students. Participants reported on their use of study strategies, including rote strategies, cognitive strategies, self-regulatory activities in study and their persistence in academic tasks. Factor analyses yielded no common factor solution to characterize the fifth and sixth graders, the seventh and eighth graders, and the college students. Three-factor solutions for the age groups' reports of study activities indicated a developmental trend for increasing differentiation of lower-level (rote) strategies and higher-level (meaning based) strategies emerging with such differentiation in the junior high school years.

Introduction

Various study skills inventories have been used to describe individual differences in how individuals attempt to master academic tasks. Weinstein and her colleagues (1988) have developed the LASSI (Learning and Study Strategies Inventory) for use with college students needing remedial help in their academic work. Schmeck and his colleagues (Schmeck, Ribich, & Ramanaiah, 1977) also have used a self-report measure to assess college students' learning skills. Separate research efforts have focused on younger children: Meece, Blumenfeld, and Hoyle (1988) measured self-reported use of learning strategies in fifth- and sixth-grade students. Nolen (1988) investigated strategy use in eighth graders, while Nolen and Haladyna (1990) described a self-report measure for assessing high school students' beliefs in the value of various study strategies. None of these studies considered possible changes over age in the nature of study activities or in their relationships to other measures. However, other researchers (e.g., Schneider, Korkel, & Weinert, 1987) have shown that the relationships among measures of metacognition and strategy use vary with age level, and studies of the factor structure of standardized intelligence tests show more complex factor structures for more mature children (Kaufman, 1979; Stone, Gridley, & Gyurke, 1991). Thus it may be appropriate to ask whether there are developmental changes in metacognitions about study activities and strategy use.

Method

Subjects

Research participants were 276 children from one private and three parochial schools in a large Southern city, and 168 students from a private university in the same city. Children were divided into two groups. The younger age group consisted of 166 fifth and sixth graders (mean age = 11 years, S.D. = 0.7). 54% were female and 39% were African-American. The older age group of children consisted of 108 seventh and eighth graders (mean age = 12.7 years, S.D. = 0.7). 55% were females and 32% were African-American. The 168 college students (mean age = 19.7 years, S.D. = 2.3, with 77% younger than 20 years) were 60% female, 10% African-American, and 10% from other ethnic groups.

Procedure

Assessment of metacognition was done by means of a self-report questionnaire (see Appendix) adapted from various instruments (e.g., Meece, Blumenfeld & Hoyle, 1988; Nolen & Haladyna, 1990; Pintrich and DeGroot, 1990; Weinstein, Palmer & Schulte, 1987). It featured three subscales (rote memory strategy use, cognitive strategy use, and self-regulation). Rote strategies included repetitive learning activities (write words over and over, remember the facts). Cognitive strategies involved meaning-based strategies (outline important ideas, how information relates to the real world). Self-regulatory activities included monitoring and testing strategies (self-testing, planning study activities). The extent to which one persisted on academic tasks was also assessed (working until it is finished, working hard on dull or uninteresting tasks). Participants used a 5-point

scale (1=never to 5=always) to indicate how often they used these strategies when they study to learn something or to get ready for a test.

Participants also responded to other questionnaires measuring their goal orientation (mastery-oriented, ego-oriented, and work-avoidant attitudes) and their causal attributions in academic situations. The questionnaires were administered to children in their classrooms over a span of three days in October. The college students were administered the questionnaires in a class room setting in a session lasting approximately 40 minutes. The order of administration of the questionnaires was counterbalanced among and within each of the schools.

Analyses

Principal Components Factor Analyses with a varimax rotation (BMDP) were performed on the pooled children's data, and on each of the age groups separately (5th and 6th grade, 7th and 8th grade, and college students).

Confirmatory factory analysis, according to procedures described by Bentler (1989), was performed to determine the fit of the (four-factor) theoretical model on the pooled children's data and for the separate children's age groups. Subsequently, empirical factor structures from the children's sample was used as a model to determine the goodness of fit of the separate age groups data.

Results

The factor analysis of the pooled children's data produced factors which did not conform to the proposed (four-factor) subscales. Analyses of the data for the younger and older children show that different factor structures are needed to characterize these two age groups. The confirmatory factor analysis produced a low goodness-of-fit index indicating that neither group fit the factor pattern of the

theoretical model (see Table 1). The hypothesis that the factor structure of the two age groups matched the empirically-derived factor structure of the pooled children's sample was not supported, even when several empirically-derived factor structures taken from the analysis of pooled data were considered. Thus, separate factor solutions were needed to characterize the responses of the two groups of children.

We hypothesized that the differences in the children's factor patterns might be developmentally related. Hence, college students were recruited to extend the age range of respondents. To examine developmental trends in response patterns, factor analyses were carried out separately for each of the three age groups (5th-6th graders, 7th-8th graders, and college students; see Table 2). The aim of these analyses was to identify a set of factors that described reports of study activity of each age group.

For the youngest group, a three-factor solution accounted for 36% of the variance in scores. The first factor included 20 items which included all strategies: cognitive strategy use, rote strategy use, and use of strategies for self-regulation (i.e., self-testing and checking). The second factor measured persistence. The third factor included a set of self-regulation and persistence items that were worded negatively in the questionnaire and generally reflected ineffective or unsuccessful study activities.

For the older child group (7th and 8th graders), a three-factor solution accounted for 34% of the variance. The first factor contained items reflecting effort management (i.e. persistence and self-regulation 'attention' items). The second factor measured the use of higher level strategies, including cognitive strategy and

self-regulation 'testing and checking' items. The third factor contained a mixture of lower and higher level strategy items.

For the college students, a three-factor solution accounted for 34% of the variance in scores. As in the older child group, the first factor contained items reflecting effort management (i.e. persistence and self-regulation 'attention' items). The second factor measured the use of lower-level (rote) strategies. The third factor was an index of higher-level strategy use, including cognitive strategy and self-testing items.

Conclusion

The pattern of these factor structures indicate that 5th and 6th graders do not differentiate between lower- and higher-level strategies, and their responses to effort management items are biased by the manner in which the item is written. In contrast, seventh- and eighth -grade children give a consistent response pattern to all effort management items. They display differentiated response patterns for lower- and higher-level strategy items, although this differentiation is not complete. For college students discriminant response patterns for effort management, lower-level strategy, and higher-level strategy items emerge.

Appendix

Questionnaire Items used to Measure

Students' Metacognitions about Study Activities

Rote Memory Strategies

2. When I study for a test, I try to remember as many facts as I can.

6. When I study for a test, I practice saying all the facts over and over to myself.

11. When I read things assigned for this class, I say the words over and over to help me remember what I read.

16. I memorize rules, definitions, or facts without trying to understand them.

20. If I really want to learn and understand something, I make sure I can spell all the new vocabulary words.

25. If I really want to learn and understand something, I memorize all the new vocabulary words.

30. If I really want to learn and understand something, I copy down important paragraphs exactly the way they are in the book.

34. If I really want to learn and understand a chapter, I read it over and over.

38. When I study for a test, I write sentences over and over.

42. If I really want to do well, I memorize everything I think will be on the test.

Cognitive Strategy Use

3. When I study for a test, I try to put together the information from what the teacher says in class and from the book.

8. When I do homework, I try to remember what the teacher said in class so I can answer the questions correctly.

12. When I study for a hard test, I try to outline the important ideas.

17. I learn new words or ideas by thinking of how they might be useful in the real world.

22. I try to relate what I am studying to my own experiences.

26. I make drawings or sketches to help me understand what I am studying.

31. I try to put things into my own words, in order to understand them better.

35. In order to really learn and understand something, I try to see how the information fits in with what I already know.

39. In order to really learn and understand something, I think about how I would explain it to somebody else.

43. In order to really learn and understand something, I write a short summary of the main ideas.

Self-Regulation

1. I pay attention to the things that I am supposed to remember.

4. I ask myself questions to make sure I know the material I have been studying.

7. I try to figure out how the work I am doing fits with what I have learned before.

9. Before i begin studying, I think about the things I will need to do to learn.

13. If I really want to learn and understand something I am reading, I stop once in awhile to make sure I can remember what I just read.

14. I often find that I have been reading for class, but don't know what it is all about. (R)

18. I check to see if I understand what the teacher is saying in class.

21. If I really want to learn and understand something I am reading, I ask myself if it makes sense to me.

23. I am distracted from my studies very easily. (R)

27. I don't understand some of the things the teacher says because I don't listen carefully. (R)

28. When I am doing math problems, I check t see if my answers make sense.

32. When I take a test, I often find that I have studied the wrong material. (R)

36. I test myself to be sure I know the material I have been studying.

40. My mind wanders a lot when I study. (R)

44. When I am studying, I go back over things I didn't understand the first time.

Persistence

5. When work is difficult, I give up. (R)

10. I work hard to get a good grade even when I don't like a class.

15. I keep at my homework for as long as it takes to get done.

19. I put off studying more than I should. (R)

24. I always get my homework done.

29. I try to find some excuses for not doing a homework assignment. (R)

33. Even when study materials are dull and uninteresting, I keep working until I finish.

37. I only study the subjects that I like. (R)

41. I put a lot of time and effort into my schoolwork.

45. When I am doing homework, I skip the hard parts. (R)

Table 1

Model Fit Indices for Both Samples

Factor Derivation Method

	Empirical				Theoretical
	3 Factors		4 factors		[4 factors]
	Factor loading criteria				
	.5	.4	.5	.4	
BBNFI	.590	.488	.582	.458	.334
BBNNFI	.719	.684	.697	.642	.475
CFI	.758	.705	.742	.662	.499
chi-square	983.8	2005.7	925.9	2502.4	3628.2
d.f.	560	1242	510	1470	1890
p<	.001	.001	.001	.001	.001

Table 2

Items creating factor structures for each age group

(all item factor loadings exceed 0.4)

5th and 6th grade

Factor 1: 3,7,8,9,11,12,13,17,18,20,21,22,25,26,34,35,38,39,43

Factor 2: 1,2,4,6,10,15,24,29,33,36,37,41,42,44,

Factor 3: 14,16,19,23,27,32,40,45

7th and 8th grade

Factor 1: 1,2,5,10,14,19,23,24,27,28,29,33,37,40,4145

Factor 2: 4,6,7,8,13,18,21,31,35,36,44

Factor 3: 12,17,22,25,26,30,34,38,39,43

College

Factor 1: 1,3,5,10,15,19,23,24,27,29,33,37,40,41,44,45

Factor 2: 2,6,11,12,13,30,34,38,42

Factor 3: 7,17,21,22,26,31,35,39

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